
Gap junction adhesion is necessary for radial migration in the neocortex.

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Public Summary:

Scientific Abstract:

Radial glia, the neuronal stem cells of the embryonic cerebral cortex, reside deep within the developing brain and extend radial fibres to the pial surface, along which embryonic neurons migrate to reach the cortical plate. Here we show that the gap junction subunits connexin 26 (Cx26) and connexin 43 (Cx43) are expressed at the contact points between radial fibres and migrating neurons, and acute downregulation of Cx26 or Cx43 impairs the migration of neurons to the cortical plate. Unexpectedly, gap junctions do not mediate neuronal migration by acting in the classical manner to provide an aqueous channel for cell-cell communication. Instead, gap junctions provide dynamic adhesive contacts that interact with the internal cytoskeleton to enable leading process stabilization along radial fibres as well as the subsequent translocation of the nucleus. These results indicate that gap junction adhesions are necessary for glial-guided neuronal migration, raising the possibility that the adhesive properties of gap junctions may have an important role in other physiological processes and diseases associated with gap junction function.

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